

GRL 2016 Annual Report

2016 ANNUAL REPORT

**ADVANCED DISPOSAL SERVICES
GLACIER RIDGE LANDFILL
DODGE CO., WI
WDNR LIC. # 3068**

Prepared For:

**Advanced Disposal Services
Glacier Ridge Landfill
N7296 Highway V
Horicon, WI 53032**

Prepared By:

**Environmental Sampling Corporation
P.O. Box 12
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April 2017



Advanced Disposal

April 28, 2017

Ms. Ann Bekta
Wisconsin Dept. of Natural Resources
South Central Region
2514 Morse Street
Janesville, WI 53545-0249

RE: 2016 Annual Report
Advanced Disposal Service Glacier Ridge Landfill, Lic. #3068
Dodge County, Wisconsin

Dear Ms. Bekta:

Pursuant to condition No. 42, 43 and 44 of the Wisconsin Department of Natural Resources (WDNR) Southeast Expansion Plan of Operation and Hazardous Waste Remediation Variance approval dated October 13, 2013, for Advanced Disposal Services Glacier Ridge Landfill (#3068), we are pleased to provide the Department with two copies of the enclosed 2016 Annual Report. This report also includes the annual reporting requirements for the site bio-pile operation (License No. 3792), Leachate Recirculation and RD&D Plan, and the Waste Stability Plan. Per the WDNR Southeast Expansion Plan of Operation and Hazardous Waste Remediation Variance approval, the annual report submittal date is April 30th of each year. If you have any questions regarding this report, please contact Lonn Walters of Advanced Disposal Service Glacier Ridge Landfill at (920) 387-0606. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Lonn Walter".

Lonn Walter
General Manager

cc: Adam Hogan, WDNR Fitchburg
Tim Curry, ADS-Midwest (electronic copy)
Kari Rabideau, ADS-Midwest (electronic copy)
ADS-GRL File
John St. Peter, ADS-GRL Standing Committee (hard copy)
Mary Dessereau, ADS-GRL Standing Committee (hard copy)
Don Hilgendorf, ADS-GRL Standing Committee (electronic copy)
Tyler Field, Cornerstone Environmental Group (electronic copy)
Sherren Clark, SCS Engineers (electronic copy)
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SECTION 1

Introduction

Advanced Disposal Services Glacier Ridge Landfill, LLC (ADS-GRL) operates a municipal solid waste disposal facility in the SE ¼ of the NW ¼, of Section 35, T12N, R16E in the Town of Williamstown, Dodge County, Wisconsin. This annual report addresses the 2016 annual reporting requirements for ADS-GRL (License No. 3068).

ADS-GRL is providing to the WDNR this annual report discussing site operations and the results of the environmental monitoring program as required by Conditions Numbered 42, 43 and 45 of the October 13, 2013 Plan of Operation Approval. These conditions supersede all the annual reporting requirements contained in previous approvals except for the annual reporting requirements in the Department's May 4, 2007 Research Development and Demonstration Plan of Operation approval modification.

SECTION 2

Responses to Annual Report Requirements

The following are provided in response to Conditions 42, 43 and 44 of the Wisconsin Department of Natural Resources Plan of Operations Approval letter dated October 13, 2013. The approval conditions and responses are subdivided into the following categories: General, Waste Volumes and Types, Gas Extraction System, Groundwater and Gradient Control, Leachate Collection and Recirculation System, and Drainage and Cap Maintenance. The WDNR Conditions are listed in bold and italics and ADS's response is provided in plain text following each condition.

Condition 42: Veolia shall submit an annual report to the Department no later than April 30th of each year that summarizes the following activities from the previous calendar year:

Advanced Disposal Services Glacier Ridge Landfill is providing this annual report to the Department to satisfy this condition.

2.1 GENERAL

42 (a) *Provide full size topographic map or plan view drawings to show the site and surrounding areas one-quarter mile in all directions. On the map show property boundary, any structures, private water supply wells, and property owner's name.*

A full size topographic map entitled “Property Boundaries, Structures, and Private Wells” is provided as **Figure 1** in the Figures section.

42 (b) *Provide a color coded site map showing all landfill phases marked, all wells including the abandoned wells numbered and labeled, the entire leachate collection and transfer piping system, gas system (including all buried components), and gas monitoring probes.*

A color-coded site map entitled “Site Monitoring Plan” is provided as **Figure 2** in the Figures section.

42 (c) *Provide a color coded site map showing all landfill phases marked, areas covered with final cover, areas covered with intermediate cover, and areas actively being filled.*

A color coded site map titled “Current Waste Filling and Cover System Development” is provided as **Figure 3** in the Figures section. The information listed below is provided on the Figure.

- Phase delineation
- Areas that have received intermediate cover
- Areas where waste placement was conducted in 2016

- Areas that have achieved approved final grades and final cover has been placed
- Areas of the landfill yet to be developed

42 (d) Provide aerial survey for purpose of settlement calculation of the final cover. At a minimum, vertical datum (MSL) and horizontal datum based on the Wisconsin state plan coordinate system will be provided for all gas extraction well locations.

An aerial survey entitled “Final Cover Settlement Aerial Survey” is provided as **Figure 4** in the Figures section. Location information (i.e. northing and easting) for each gas extraction well location is provided as Table 1 inset on **Figure 4**.

SCS reviewed annual flyover survey data obtained in 2015 and 2016 for potential areas of abnormal settlement or shifting waste that may be related to leachate recirculation or additional liquids disposal. No leachate recirculation has occurred in final cover Areas 1, 2, and 3 of the closed North Hill; therefore, they were not analyzed. Areas analyzed included final cover Areas 4 and 5, as well as the perimeter of the South Expansion. Settlement was observed in most non-active recirculation areas. Limited areas in the South Expansion displayed settlements greater than 3 feet, mostly around access road locations. No settlements were observed as abnormal or unexpected.

2.2 WASTE VOLUMES AND TYPES

42 (e) Total volume and tonnage of special wastes, and tabulation by waste category for each of the waste types in the special waste plan which were accepted for the disposal the previous calendar year.

The total volume of special waste received in 2016 was 187,933 CU yds. or 172,774 tons. A table summarizing the special waste received by waste category for the calendar year is included in **Appendix A, Attachment A-1**.

As part of the WDNR approved LGRL Waste Relocation Project, Phase C of the project began on January 4, 2016 and was completed on March 23, 2016. All of the waste from LGRL has now been removed and relocated to ADS-GRL.

42 (f) Computation of the total volume of all wastes disposed at this facility, and the proportions of special wastes compared to the total volume of landfill filled.

The total volume of waste received in 2016 was 891,409 CU Yds. or 596,418 tons. A table summarizing the total volume of all-waste types received for the calendar years is included in the License Renewal Application provided as **Appendix A, Attachment A-2**. The ratio of all-waste types to special waste received in 2016 was approximately 4.7 to 1.

$$\frac{\text{All-Waste Types} = \frac{891,409 \text{ CU yds}}{\text{Special Waste} = 187,933 \text{ CU yds}}}{\text{Special Waste}} = 4.7 \text{ to } 1$$

42 (g) The use of alternate daily cover material. The report shall contain at a minimum the following:

i. Identification of the waste generator or hauler of the alternate daily cover material accepted for disposal.

A table summarizing the waste generators or haulers of the alternative daily cover material is included in **Appendix A, Attachment A-1**.

ii. Quantity of material used as alternative daily cover (in units of cubic yards and tons).

Quantities of shredder fluff, foundry waste, contaminated soils, and sludge used for alternate daily cover (ADC) in 2016 are listed in the table below.

2016 Quantities of Alternative Daily Cover Materials			
Material	Tons ⁽¹⁾	Cubic Yards ⁽²⁾ (compacted in place)	Density ⁽³⁾ (lbs/cy)
Shredder Fluff	7,780	7,780	2,000
Foundry Waste	2,574	1,716	3,000
Contaminated Soil	1,810	1,207	3,000
Sludge	47,450	43,136	2,200
Totals	59,614	53,839	--

Notes: (1) Tonnages were obtained from the 2016 License Renewal Application. Shredder fluff includes tonnages for category 22 (CAT 22 Fluff) materials. Foundry waste includes tonnages for category 21 (CAT 21 Sand) materials. Contaminated soil includes tonnages for category 19 (CAT 19 Waste Used as Cover) and category 21 (CAT 21 High Volume Industrial ADC) materials

(2) In place compacted cubic yards are calculated based on weighed scale receipts (tonnage column above) and estimated in place compacted densities (density column above).

(3) In place compacted densities were obtained from standard WDNR conversion factors contained in Table 4 of NR 520.15 (2). The density used for shredder fluff is that specified for compacted in place industrial waste. The same density specified for in field compacted foundry waste was used for contaminated soil.

All the shredder fluff listed in the above table was utilized for ADC. The shredder fluff analytical data is provided as **Appendix A, Attachment A-3**.

iii. Estimated density of the daily cover materials.

See Density in above table under sub paragraph 42(g)ii.

iv. Coverage ratio.

During 2016, 53,839 cubic yards of ADC was used for daily coverage. The ratio of waste to ADC was 15.6 to 1. This calculation is provided below in response to condition 42(g)(vi) regarding the ratio of waste to ADC by volume.

v. Alternative beneficial use applications such as dikes, berms or other structures in the landfill.

All shredder fluff received (7,780 tons) and a portion of the foundry waste received (2,574 tons) was utilized for ADC. A portion of the sludge materials received (47,450 tons) for beneficial reuse during 2016 was used as ADC. No contaminated soils were used for beneficial reuse during 2016 the soils were either incorporated into the active bio-pile or stockpiled for the next bio-pile.

A portion of the petroleum contaminated soil (C-soil) accepted in 2016, but not tracked separately from ADC, had combined DRO/GRO concentrations less than 250 mg/kg and was utilized as beneficial reuse upon receipt. The remainder of the C-soil received during 2016 was either incorporated into the active bio-pile or stockpiled for the next bio pile.

vi. The ratio of waste to alternative daily cover by volume for the year.

During 2016, the facility received a total of 891,409 CU yds of total waste. ADC materials made up 53,839 CU yds of the total waste. The total waste received at the facility, less ADC materials, was 837,570 CU yds. The ratio of waste to alternative daily cover by volume for 2016 is provided below.

$$\text{Waste to ADC Ratio} = \frac{\text{Total Waste (less ADC)}}{\text{ADC}} = \frac{837,570 \text{ CU yds}}{53,839 \text{ CU yds}} = 15.6 : 1$$

vii. Discussion of problems encountered and recommendations.

No problems were encountered using any of the ADC materials in 2016.

2.3 GAS EXTRACTION SYSTEM

42 (h) Records of periods of shutdown of the gas extraction system, length of time of shutdown, and corrective action for the system or individual extraction wells.

A summary of the periods of shutdown of the gas extraction system and the length of time of each shutdown is provided in the Downtime Report (**Appendix B, Attachment B-1**). The downtimes resulted in a total of 75.75 hours in 2016. Any downtime that required corrective action during 2016 was included in the Annual Compliance Report which was provided to the Department as required by the Air Pollution Control permit. Effective responses to rectify system shutdowns resulted in a 99.1% system operational status throughout 2016.

Monthly monitoring data for the individual gas extraction wells is included on the Gas Extraction Reports provided as **Appendix B, Attachment B-2**. Exceedances of the operating conditions at the individual gas extraction wells are noted on the gas extraction report. Any exceedances that were not corrected within the timeframe specified by the Air Pollution Control permit were documented in a deviation report and summarized in the Semi-Annual Data Report and Annual Compliance Report as required by the Air Pollution Control permit.

42 (i) Any maintenance, cleaning, repair, or replacement of extraction wells, header or lateral lines, blower or gas combustion equipment components, or valve assemblies.

Maintenance performed on gas extraction system components in 2016 is summarized on the Maintenance Log provided as **Appendix B, Attachment B-3**. In addition to these maintenance items, the blower fan and motor bearings are greased bi-weekly as part of routine blower maintenance.

There were no new vertical gas extraction wells or supplemental gas extraction points installed during the reporting period; however, the landfill gas collection system was expanded during the reporting period. The system was expanded to include additional gas collection and control system (GCCS) piping in the South Expansion area of the facility and modifications to the condensate knockout lines to improve drainage. During the evaluation of potential causes of the surface emissions standard exceedances that began in December 2015, ADS determined that a primary factor was the lack of adequate vacuum in portions of the South Expansion GCCS piping. In order to address this issue, 24-inch piping was installed from the perimeter landfill gas header on the north side of the South Expansion to an existing 12-inch gas pipe between gas extraction wells GE-117 and GE-124. Existing gas wells were connected to the piping with several laterals. The installation of the additional piping addressed the vacuum loss issue and also provided an alternate pathway for landfill gas from the southern portion of the facility to reach the blower without relying solely on the perimeter header. Details of the landfill gas collection system improvements were provided

to the WDNR in the Construction Documentation Report Addendum 2015 Final Cover, dated July 21, 2016. Construction of the gas system improvements, including the installation of approximately 2,450 linear feet of gas header and lateral piping, and modification to the condensate sump, was approved by the WDNR on August 9, 2016.

As noted previously, there were surface emissions exceedances that began in December 2015 and continued into 2016. These exceedances were resolved with the third quarter surface emissions monitoring event conducted on July 13, 2016, which was within the timeframe allowed by the March 16, 2016 Plan Modification Request. Additional information regarding the surface emissions monitoring exceedances was provided in the Air Pollution Control permit Semi-Annual Data Report dated August 17, 2016.

Three supplemental gas extraction points (i.e. leachate recirculation lines) were decommissioned during the reporting period in accordance with the January 12, 2016 WDNR approval. The abandonment of these points was documented in the Semi-Annual Startup, Shutdown, Malfunction Plan Report dated August 15, 2016.

- 42 (j) *An assessment of the performance of the gas extraction system, including liquid levels in the gas extraction wells, the quality and quantity of gas and gas condensate produced from the facility, and the removal of volatile organic compounds and other substances in the gas and gas condensate. Also, include a summary of gas wells experiencing high leachate head levels and any corrective actions taken.***

Gas Extraction System Performance: The ADS-GRL gas extraction system operated for 99.1% of 2016. System downtimes were documented on the Downtime Report provided as **Appendix B, Attachment B-1.** ADS-GRL personnel were effective in rectifying system shutdowns to keep downtime at a minimum.

Liquid Levels in the Gas Extraction Wells: ADS-GRL personnel conducted the annual liquid level measurements at all of the gas extraction wells in June 2016. Monitoring data for the gas extraction wells located on the closed North Hill (GE-1 through GE-36) indicate that less than 50% of the screen was submerged at each location. No additional monitoring was required at the gas wells located on the North Hill. The South Expansion area monitoring data indicates that five gas extraction wells (GE-101, GE-111, GE-112, GE-116, and GE-118) had 50% or more of the screen submerged during the annual event. The remaining South Expansion area gas extraction wells had less than 50% of the screen submerged. Although not required, all gas wells in the South Expansion area were re-monitored for liquid levels in July 2016. The five wells listed above had less than 50% of the screen submerged during the follow-up monitoring event. One gas well located in the South Expansion area (GE-110) did not have a high liquid level during the annual event in June, but had 50% of the screen submerged during the July 2016 monitoring event. This well was re-monitored in August 2016 and has less than 50% of the screen submerged.

Monitoring was conducted in accordance with Condition 37 of the October 13, 2013 Plan of Operation Approval. Any vertical gas extraction well with head levels covering 50% or more of the screened interval was remeasured within 90 days of the initial measurement. No wells had leachate head levels covering 50% or more of the screened interval for two or more consecutive monitoring events. No corrective action was required.

A summary of the gas well leachate levels recorded in June 2016 and supplemental monitoring conducted in July and August 2016 is provided as **Appendix B, Attachment B-4**. Gas well liquid level monitoring conducted prior to the annual monitoring event in June 2016, was provided to the WDNR in the 2015 Annual Report Addendum dated July 22, 2016.

Gas well liquid level monitoring conducted in October 2016 is provided in SCS Engineers Technical Memorandum: Annual Reporting for Leachate Recirculation and RD&D (**Appendix D, Attachment D-1**). This monitoring was conducted beyond the scope of the permit as an internal monitoring request. All liquid levels indicated less than 50% of the screen was submerged at each location during the October 2016 monitoring event. No additional action was required.

Additional liquid level measurements were taken in the North Hill wells as part of an evaluation of previously reported elevated leachate levels. The results of the North Hill liquid level evaluation were reported to the WDNR in a letter dated January 19, 2016.

Gas Quality and Gas Quantity: Gas quality readings (percent methane (CH₄), carbon dioxide (CO₂), oxygen (O₂), balance gas, temperature, flow rate and vacuum) are recorded monthly (at a minimum) at the blower. Inlet blower readings indicate the average CH₄ concentration was 50.6% and the average O₂ concentration was 0.9% by volume. No significant changes in gas quality were observed in 2016. Gas blower readings are provided in the Gas Extraction Report (**Appendix B, Attachment B-2**).

A total of 1,482,521,027 cubic feet of landfill gas was collected during 2016. This is increased from the 1,209,021,090 cubic feet of landfill gas collected during 2015. The Gas Volume summary provided as **Appendix A, Attachment B-5** includes the average monthly gas flow, flare temperature, and volumes of gas managed.

ADS-GRL staff monitored %CH₄, CO₂, O₂, balance gas, temperature (°F), flow rate (cfm) and vacuum (inches H₂O) at all gas extraction wells on a monthly basis. The Gas Extraction Report is provided as **Appendix B, Attachment B-2**.

Quarterly gas probe monitoring readings were recorded by ADS-GRL staff in January, April, July, and October. Low-level methane was reported at gas probe GP-01 (0.1%), GP-03 (0.1%), and GP-11 (0.3%) during the July 2016 event. Site personnel indicated that during the monitoring of GP-11, the gas meter displayed 0.0% methane on the screen, but stored as 0.3% in the data file. It is suspected that a similar situation occurred at GP-01 and GP-03. After the discrepancy was identified, an additional monitoring event was conducted

at these three probes in August. No methane was detected. The low-level methane reported during the July event was less than the lower explosive limit and is therefore not an exceedance in accordance with NR 507.22(1)(c). No methane was detected at the other 15 gas monitoring probes during the July 2016 event and no methane was detected in any of the probes during the remaining quarterly events in 2016. Gas probe monitoring data is provided as **Appendix B, Attachment B-6**.

Gas Condensate Quantity: An accurate estimate of gas condensate collected at the condensate lift station and condensate knockout K.O.#2 can be made based on the pump run time hour meter (provided by ADS-GRL personnel) and the flow rate of the pump (approximately 12 gpm provided by pump manufacturer). The estimated volume of gas condensate generated in 2016 is 366,840 gallons.

Condensate Quality/VOCs removed: Landfill gas condensate is sampled and analyzed semi-annually in April and October for field parameters, inorganic parameters and VOCs. The April and October 2016 analytical data is summarized in **Appendix B, Attachment B-7**. Gas condensate analytical results are consistent with historical data and show no apparent trends. The gas blower is sampled annually for VOCs by method TO-15 and sulfur compounds by method ASTM D-5504; the laboratory analytical data is provided as **Appendix B, Attachment B-8**.

2.4 GROUNDWATER AND GRADIENT CONTROL

42 (k) An assessment of the groundwater and surface water flow patterns and quality trends.

An assessment of the groundwater and surface water quality have been compiled as part of the semi-annual Groundwater Monitoring Results reports prepared and submitted by SCS (**Appendix C, Attachment C-1**). A summary of the groundwater and surface water flow patterns and quality is provided below.

Groundwater Monitoring Wells

Semi-annual sampling of monitoring points takes place in April and October. Annual sampling is conducted in October. Forty-three non-Subtitle D monitoring wells are monitored semi-annually for indicator parameters. Thirty-four of these wells are sampled annually in October for volatile organic compounds (VOCs) while the remaining nine are sampled semi-annually for VOCs. Six additional Subtitle D wells are sampled semi-annually in for indicator parameters and VOCs. Seven additional groundwater monitoring wells and seven horizontal wells are monitored semi-annually for water level only. In addition, there are 10 private water supply wells sampled annually in October for indicator parameters, metals and VOCs. Quality control samples were collected during the semi-annual events in accordance with ESC and WDNR procedures. In addition, water elevation, specific conductance, pH, temperature, color, odor and turbidity are measured in the field at each monitoring point during sampling.

Groundwater monitoring was conducted by Environmental Sampling Corporation (ESC). Samples were analyzed by Pace Analytical Services of Green Bay, Wisconsin (Wisconsin Laboratory Certification No. 999407970). Laboratory analytical data for the April and October 2016 events was submitted in electronic format to the Department with the Groundwater Monitoring Results submission prepared and submitted by SCS Engineers (**Appendix C, Attachment C-1**).

The April and October 2016 laboratory analytical data was compared to Wis. Adm. Code NR140 Preventive Action Limits (PAL) and Enforcement Standards (ES) for Public Health and Public Welfare. Analytical data was also compared to the well-specific PALs for Groundwater Indicator Parameters.

Exceedances of NR140 Standards and well-specific Indicator Parameters are summarized in the tables provided below.

NR 140 Standard or ACL Exceedances						
Well	Chloride	Benzene	cis-1,2-Dichloro-ethene	Tetrahydro-furan	Trichloro-ethylene	Vinyl Chloride
MW-1AR			Apr/Oct (ES)	Oct (ES)		Apr/Oct (ES)
MW-1RR						Apr/Oct (ES)
MW-301	Apr/Oct (ES)					
MW-403	Apr/Oct (ES)	Oct (PAL)	Apr/Oct (PAL)		Apr/Oct (PAL)	Apr/Oct (ES)
MW-406						Apr (ES)
P-306A	Apr/Oct (ACL)					
P-403A		Apr/Oct (PAL)				Apr (ES)
P-406A						Apr/Oct (ES)
P-406B		Apr/Oct (PAL)				Apr/Oct (ES)

Indicator Parameter Exceedances			
Well	Alkalinity	Hardness	Spec.Cond
MW-1RR	Apr/Oct		Apr
MW-301	Apr/Oct	Apr/Oct	Apr/Oct
MW-309		Apr/Oct	
MW-403	Oct	Apr/Oct	Apr/Oct
MW-406	Oct	Oct	
P-306A		Apr/Oct	
P-406A	Apr	Apr	
W-153A			Oct
W-154			Oct
W-155		Apr	Apr
W-158	Apr/Oct	Oct	Apr/Oct
W-159	Oct		

Indicator Parameter Exceedances			
Well	Alkalinity	Hardness	Spec.Cond
W-159A			Apr/Oct
W-161R	Oct		Oct
W-165	Apr/Oct	Apr/Oct	Apr/Oct
W-166	Apr		

The NR140 public welfare parameter exceedances for chloride are attributed to road salt or calcium chloride used for dust control. NR141 exceedances for VOCs are typically associated with the former Land and Gas Reclamation Landfill (LGRL). Indicator parameter exceedances for samples collected from wells installed to monitor the southern expansion and the closed northern GRL may be due to earthmoving activities, the groundwater control trench operation, other groundwater flow changes, changes in surface water runoff and or wetland restoration activities. The indicator parameter exceedances for samples collected from wells located near the former LGRL are likely due to LGRL. Additional information pertaining to groundwater quality at the facility is provided in the Groundwater Monitoring Results submissions included in **Appendix C, Attachment C-1**.

Groundwater flow across the facility is generally to the north and northeast although locals groundwater flow pattern vary slightly immediate around the facility.

Lysimeters

The facility has seven lysimeters (LS-1 through LS-7) that are monitored monthly for liquid level and discharge volume pumped, semi-annually for indicator parameters, chloride, sulfate, COD, sodium and total kjeldahl nitrogen, and annually in October for VOCs. The lysimeter monthly liquid levels and discharge volumes are provided as **Appendix C, Table C-1**. Laboratory analytical results are provided in **Appendix C, Attachment C-2**. The lysimeters are not subject to NR140 Standards; however, laboratory results are reviewed for changes in water quality. The 2016 data was generally consistent with historic data.

Laboratory analytical data for the April and October 2016 events was submitted in electronic format to the Department with the Groundwater Monitoring Results submission prepared and submitted by SCS Engineers (**Appendix C, Attachment C-1**).

Gradient Control System

The gradient control system consists of semi-annual water level monitoring at one headwell (GCM-1) and one underdrain monitoring point (UDM-1) and semi-annual sample collection at one gradient control point (GCL-1) and two underdrain monitoring points (UDL-1 and UDG-1). Samples collected from GCL-1 were analyzed semi-annually for field parameters and concentrations of chloride, hardness, and alkalinity. Samples collected form UDL-1 were analyzed semi-annually for field parameters and concentrations of chloride, hardness, alkalinity, and VOCs. There was no flow to UDG-1 during the semi-annual monitoring events conducted in 2016. No samples were collected.

Laboratory analytical data for the April and October 2016 events was submitted in electronic format to the Department with the Groundwater Monitoring Results submission prepared and submitted by SCS Engineers (**Appendix C, Attachment C-1**).

The April and October 2016 laboratory analytical data was compared to Wis. Adm. Code NR140 Preventive Action Limits (PAL) and Enforcement Standards (ES) for Public Health and Public Welfare. Exceedances of NR140 Standards are summarized below.

NR 140 Standard Exceedances				
Well	Chloride	Benzene	cis-1,2-Dichloro-ethene	Vinyl Chloride
GCL-1	Apr/Oct (PAL)			
UDL-1	Apr/Oct (PAL)	Oct (PAL)	Apr/Oct (PAL)	Apr/Oct (ES)

Additional gradient control system monitoring is conducted in accordance with the facility's WPDES permits. Samples are collected from Outfall 1 semi-annually for TSS analysis in accordance with the WPDES general permit for pit/trench dewatering. There were no exceedances of the discharge limits at Outfall 1 during 2016. The WPDES 2016 Annual Discharge Monitoring Report was provided to WDNR on January 13, 2017.

Monitoring was also conducted in accordance with the WPDES general permit for discharge of contaminated groundwater from remedial action. During 2016, samples were collected from Outfall 1 (GW Control Trench) semi-annually and during periods of construction dewatering associated with underdrain construction. No samples were collected from Outfalls 2, 3, or 4 because these outfalls were not in use; all flow was directed to Outfall 1 (GW Control Trench). The samples collected from Outfall 1 (GW Control Trench) were analyzed for TSS, pH, and VOCs specified in the WPDES permit. There were two exceedances of the discharge limit for TSS for the daily samples collected during construction dewatering in March 2016. The elevated TSS concentration were attributed to the breaker run stone placed during construction and the subsequent rain which flushed the fines from the stone. The elevated TSS concentrations were temporary and directly related to construction activities and did not represent the actual TSS of the groundwater discharged. Subsequent samples did not exceed the discharge limits. No additional monitoring was required beyond the scope of the permit. WDNR was notified of the exceedances by phone and subsequent monitoring results were provided via e-mail. Monitoring results were provided to the WDNR in the WPDES semi-annual monitoring reports dated July 14, 2016 and January 13, 2017.

Surface Water

Fifteen staff gauge elevations are measured semi-annually. A summary of the staff gauge monitoring data is provided as **Appendix C, Attachment C-3**. During 2016, staff gauge SW-8 was damaged and no surface water elevation was obtained. This gauge was repaired

during 2017; a surface water elevation was obtained during the April 2017 event. The surface water levels at SW-9 and SW-12 were above the staff gauge during the semi-annual monitoring events. Surface water point SW-20 was dry during the April 2016 event and point SW-22 was dry during both the April and October monitoring events.

Surface water flow is transmitted via site ditches and directed to the five sedimentation basins which discharge to wetlands surrounding the site. The sedimentation basins are monitored in accordance with WPDES Tier 2 permit requirements. All surface water drainage structures on the landfill and landfill perimeter including the sedimentation ponds and water discharges are in good condition and are inspected weekly for proper operation.

42 (l) An assessment of the condition and operation of the gradient control system.

The volume pumped from the gradient control monitoring point (GCL-1) and underdrain monitoring point (UDL-1) are recorded as monthly totals and reported semi-annually. Volumes pumped from GCL-1 and UDL-1 during 2016 are provided as **Appendix C, Table C-2**. These points are also sampled for indicator parameters semi-annually in April and October. UDL-1 is also monitored for VOCs semi-annually. A summary of the laboratory analytical data for these monitoring points is provided as **Appendix C, Attachment C-4**. Based on the monitoring observations throughout 2016, the gradient control system is in good condition and functioning properly.

2.5 LEACHATE COLLECTION AND RECIRCULATION SYSTEM

42 (m) Tabulation of volumes of leachate, leachate heads, and chemical quality data for the leachate.

Leachate volumes, leachate head levels, and a summary of the leachate quality for 2016 is included in the SCS Engineers Technical Memorandum: Annual Reporting for Leachate Recirculation and RD&D (**Appendix D, Attachment D-1**).

In general, the leachate results for 2016 are similar to previous data. Leachate concentrations are acceptable for disposal.

42 (n) A summary of warning symptoms, terminations and resumptions of leachate recirculation after termination.

There were no warning symptoms or failure thresholds observed in 2016 during leachate recirculation. Additional information regarding leachate recirculation is provided in the SCS Engineers Technical Memorandum: Annual Reporting for Leachate Recirculation and RD&D (**Appendix D, Attachment D-1**).

42 (o) A discussion of any operating problems and resolutions during the year.

In December 2016, the liquid application rate on several days exceeded the leachate recirculation plan limit due to the limited area available for liquid disposal. Although the rate was exceeded on individual days, the average daily rate for the month was below the plan limit. No operational problems were associated with application of liquids during this period. In 2017, the facility has reduced the volume of liquids being accepted until Phase 8 is ready for liquids application. Additional information is provided in the SCS Engineers Technical Memorandum: Annual Reporting for Leachate Recirculation and RD&D (**Appendix D, Attachment D-1**).

During the annual leachate line jetting on September 1, 2016, Superior Jetting experienced a soft blockage while jetting leachate cleanout LC04E in the North Hill. Superior Jetting was successful in clearing the blockage; however, upon clearing the line, the liquid in the line from the jetting process, mixed with leachate, gravity flowed to Manhole 1 and then subsequently gravity flowed to the Lift Station. This additional slug of liquid entered the Lift Station over a short period of time and overwhelmed the Lift Station pump, which allowed a mix of leachate and jetting water to exit the Lift Station. Approximately 50 gallons of leachate/jetting water exited the top of the Lift Station and was contained prior to flowing to any of the storm water structures on site. Site personnel took action immediately to cease jetting activities, install an additional pump to assist with leachate pumping, and construct a clay berm to contain the spill area. After the liquid level in the Lift Station returned to normal operating levels, the free liquids were removed and the clay berm and impacted material was removed and disposed of in the active fill area. The area was inspected and soil samples were collected to ensure that all impacted material was removed. No VOCs were detected in the soil samples collected in September 2016. WDNR was notified of the incident by phone on September 2, 2016 and additional information was provided via e-mail on September 11, 2016. Formal documentation of the incident, including photos and laboratory analytical data, was provided to the WDNR in a letter dated September 20, 2016 (**Appendix D, Attachment D-2**). In an e-mail dated September 22, 2016 (**Appendix D, Attachment D-2**), WDNR indicated that the area was inspected and no further action was required.

There was one small seep noted along the access road in the South Expansion area on October 14, 2016. The seep was repaired by digging it out and adding stone and clay. Any other small seeps were located on the internal slopes which drained into the active areas. These small seeps were addressed as they were identified during the reporting period.

42 (p) Documentation drawings or diagrams showing the installed details of the leachate distribution system added or revised since the previous annual report, including piping, pumps, and distribution media. if any included but none added

There were no additional installations to the leachate distribution system in 2016.

42 (q) Results of the liquid mass balance measurements for each leachate drainage basin.

42 (r) Leachate head levels for each leachate drainage basin.

42 (s) Graphs showing volumes of leachate extracted and recirculated and precipitation received for each drainage basin.

42 (t) Graphs over time period since leachate recirculation was initiated, for each parameter analyzed for the leachate as part of the monitoring plan.

The information required by Approval Conditions 42(q) – 42(t) is included in the SCS Engineers Technical Memorandum: Annual Reporting for Leachate Recirculation and RD&D (**Appendix D, Attachment D-1**).

42 (u) Documentation of cleaning efforts and observations for leachate and gradient control collection pipes, and records of integrity of the secondary containment features of the leachate extraction, conveyance, and storage system.

The annual leachate line cleanout and gradient control collection pipe cleaning was performed by Superior Jetting of Zimmerman, MN from August 24 through September 1, 2016. Line jetting documentation is provided as **Appendix D, Attachment D-3**. All leachate collection lines and gradient control collection pipes were successfully cleaned with overlapping lengths from each direction or the entire length was jetting from one direction. As indicated previously in response to Approval Condition 42 (o) there was a leachate spill that occurred during the annual line jetting event. A summary of the event and subsequent action taken is provided in **Appendix D, Attachment D-2**.

The underground leachate storage tank had no performance problems in 2016. Monthly readings of the current rectifier system for the underground leachate storage tank impressed-current corrosion protection system are provided in **Appendix D, Attachment D-4**. The rectifier readings provided (voltage and amperage) are meant to provide the operator an indication that the system is operational from month to month. Visual observations of the manholes along the alignment of the leachate discharge line from the Phase V Module 1 sideslope leachate riser to the leachate tank are made routinely.

2.6 DRAINAGE AND CAP MAINTENANCE

- 42 (v) Any evidence of differential settlement or impeded drainage, downslope soil slips or movements, exposed geomembrane or subsurface drain materials, integrity of surface swales, and other drainage features, any evidence of water ponding or formation of depressions, and cover condition in the surface water diversion berms and final cover spillways.**

SCS reviewed annual flyover survey data obtained in 2015 and 2016 for potential areas of abnormal settlement or shifting waste that may be related to leachate recirculation or additional liquids disposal. An assessment of the settlement monitoring was provided in the SCS Engineers Technical Memorandum: Annual Reporting for Leachate Recirculation and RD&D (**Appendix D, Attachment D-1**)

Inspections of the cap for settlement issues listed above were conducted monthly by ADS-GRL personnel in 2016. Cover Integrity Inspection forms are provided as **Appendix E, Attachment E-1**. During 2016, there were areas of erosion noted on the inspection forms and noted areas in which seeding was needed. There was no differential settlement or impeded drainage, no downslope soil slips or movements, no exposed geomembrane or subsurface drain material, and no water ponding or formation of depressions observed in 2016. Surface water drainage ways, diversion berms and final cover spillways are in good condition and functioning properly.

- 42 (w) An assessment of the vegetative cover vigor and diversity, evidence of animal intrusion, soil slumping or exposure of the capping layer.**

Inspections of the cap for the above mentioned issues were conducted monthly during 2016 by ADS-GRL personnel. The final cover is in very good condition with no evidence of stressed vegetation, no soil slumping, no animal intrusion or exposure of the capping layer observed. The site was mowed in 2016 to control weeds and to allow access to the gas extraction wells.

- 42 (x) A description of all repairs made to the cap and vegetative cover, protective structures, monitoring devices, and sedimentation ponds, etc.**

The landfill cap and vegetative cover was inspected by ADS-GRL personnel monthly in 2016. Minor repairs were conducted as needed and documented in the Cover Integrity Inspection reports provided as **Appendix E, Attachment E-1**.

42 (y) The actions used to minimize wind blown debris. The report shall contain at a minimum the following information:

i. Dates when wind speed was greater than or equal to 30 mph at the working face.

Wind speeds greater than 30 mph at the facility were tracked and documented on the Litter Control Tracking forms provided as **Appendix E, Attachment E-2**. If wind speeds affected the active working area, wind screens were adjusted accordingly and the working area was moved to an area of the facility with minimal wind impact.

ii. Dates when the landfill was shut down due to wind.

The landfill was not shut down due to wind during 2016. When high winds were anticipated, the site would begin to prepare the working face early by placing windscreens and fencing to try and minimize wind-blown material off the active area. During hours of operation the open working face was kept to a minimal size to contain the number and size of loads that could be unloaded into the area at one time. The site also minimized waste acceptance and certain materials during times of high winds. Dates in which the active area was relocated to an area with minimal wind impact are documented on the wind tracking summary provided as **Appendix E, Attachment E-2**.

iii. Dates when staff collected debris off-site.

ADS-GRL's site maintenance staff is responsible for policing windblown material. ADS-GRL utilizes contracted labor to assist with windblown material on an as-needed basis. A total of 2,283 hours of manpower was used in 2016 to collect windblown debris. ADS-GRL maintains records of these instances on site.

This condition supersedes all annual report requirements contained in previous approvals except for the annual reporting requirements in the Department's May 4, 2007 Research, Development and Demonstration plan of operation approval modification.

The annual reporting requirements for the Leachate Recirculation and RD&D Plan 2016 are provided with this report in the Technical Memorandum prepared by SCS Engineers (**Appendix D, Attachment D-1**). Also included in this annual report is the SCS Engineers Technical Memorandum: Organic Stability Plan Report (**Appendix D, Attachment D-5**).

Condition 43: In addition to the storm water related provisions of the plan of operation and the storm water inspection requirements of this approval, the following activities shall be performed at the landfill to demonstrate compliance with ch. NR 216, Wis. Adm. Code, regarding storm water management at the landfill facility. Results shall be included in the annual report.

43 (a) Conduct and document an annual facility site compliance inspection adequate to verify that the site drainage conditions and potential pollution sources identified in the plan of operation remain accurate, and that the best management practices prescribed in the plan of operation are being implemented, properly operate, and adequately maintained.

An annual inspection was conducted by the site personnel during 2016. The annual inspection form is provided as **Appendix E, Attachment E-3**.

43 (b) Conduct and document quarterly visual inspections of storm water discharge quality at each outfall. The inspections shall be conducted within 30 minutes after runoff begins discharging from the outfall or as soon as practical but, no later than 60 minutes after the beginning of discharge. The inspections shall include observations of color, odor, turbidity, suspended solids, foam, oil sheen or other readily observable indicators of storm water pollution. Documentation of the inspections shall include the inspection date, inspection personnel, visual quality of the storm water discharge, and probable sources of any storm water contamination.

Quarterly stormwater inspections are conducted by site personnel during 2016. Quarterly Facility SWPPP inspection forms are completed to document the visual observations. The quarterly inspection reports are provided as **Appendix E, Attachment E-4**.

Condition 44: Advanced Disposal shall include, as part of the landfill operating record required by s. NR 506.17, Wis. Adm. Code the following information:

44 (a) Special Waste disposal records.

The special waste disposal records for 2016 are provided in **Appendix A, Attachment A-1**.

44 (b) Alternative daily cover records.

The alternative daily cover records for 2016 are provided in **Appendix A, Attachment A-1**. Generators or haulers of alternative daily cover material are identified in the ADC column of the summary table.

SECTION 3

Biopile Processing Facility

Pursuant to Conditions 9 & 10 of the Wisconsin Department of Natural Resources (WDNR) Plan of Operation for the Solid Waste Processing Facility Approval dated June 23, 1995, for the Advanced Disposal Services Glacier Ridge Landfill, LLC (ADS-GRL) facility # 03792, ADS-GRL is submitting the following Biopile Closure Report.

- 9(a)** *Analyses of data from pretreatment and post-treatment samples of each soil pile, assessment of the reduction of contaminant concentrations in the soil, and length of time each soil pile was processed.*

The pre-treatment and post-treatment analytical results of the Biopile #2016 are included in **Appendix F, Attachments F-1 and F-2**, respectively. A total of 31,985 tons were deposited within Biopile #2016 as indicated in the summary provided in **Appendix F, Attachments F-1**. The pretreatment DRO and GRO concentrations averaged 8,079 ppm and 1,230 ppm respectively while post treatment total DRO and GRO concentrations averaged 287 ppm and 18 ppm respectively. Treatment lasted 110 days for Biopile #2016 beginning on August 4, 2016 and ending on November 21, 2016. Post-treatment analytical results for Biopile #2016 soils indicated that 6,000 tons of soil exceeded the combined DRO/GRO limit of 250 mg/Kg for interior on site re-use. These 6,000 tons of soil were removed and were placed in Biopile #2017 for additional remediation.

- 9(b)** *A tabulation of source and tonnage of soils contributed to each pile, type and cause of the contamination in each soil batch, and concentrations of petroleum contaminants and contaminants other than petroleum contaminants.*

Refer to **Appendix F, Attachments F-1** for source and tonnage of soils contributing to Biopile #2016 and for pre-treatment analytical concentrations of petroleum contaminants.

- 9(c)** *Record of operation of each soil pile, including total tonnage treated, total time of active operation, and any noticeable effects of temperature and seasonal conditions on the time period used for processing.*

As indicated in **Appendix F, Attachments F-1**, a total of 31,895 tons of soil was placed within Biopile #2016.

The active operation began August 4, 2016 and ending on November 21, 2016. The air temperatures ranged from 34 degrees Fahrenheit to 72 degrees Fahrenheit. Refer to **Appendix F, Attachments F-3** for biopile vacuum line monitoring logs. In comparing the effects of temperature or time of year to Biopile #2016, no notable differences were observed.

9(d) Description of the disposition of the soil used in the processing operation, whether by disposal or reuse, including any soil sent to an alternative disposal or treatment facility and disposition of any material rejected from the processing operation or subjected to additional treatment.

After biosoil is treated and meets the criteria for site re-use, its primary application is for daily cover. A secondary function of the treated soil is for the construction of core berms to screen daily operations and control drainage. When a biopile is dismantled, any portion of a biopile that did not meet the criteria for re-use is directed to another active biopile for additional remediation.

All treated soil from Biopile #2016 was used on site for waste cover. Any materials rejected while processing (rocks, wood, concrete, etc.) was disposed of within the active area.

9(e) Tabulation of gas concentration data, tabulation of ambient air data, summary of the amount of time soil air was handled by recycle mode and by direct discharge to the atmosphere, and tabulation of any data from testing air discharged to the carbon canisters and atmosphere.

Refer to **Appendix F, Attachments F-3** for the vacuum line monitoring logs. The air was handled by the recycle mode 100 percent of the operational time. By recycling the air 100 percent of the time, the need for the carbon canisters was eliminated.

9(f) Service life and disposal of spent carbon from the carbon canister.

This condition is not applicable because the system will be a closed loop system and there is no spent carbon to dispose.

9(g) Diagram of soil pile grids selected randomly for post treatment sampling and tabulation of post treatment soil testing data.

Figure 1 shows the sampling locations of Biopile #2016, and can be found in **Appendix F, Attachments F-4**. Summary tables of post treatment testing data for Biopile #2016 are also included in **Appendix F, Attachment F-2**.

9(h) *Summary of any problems encountered with the soil processing equipment or operation, proposed or implemented solutions to the problems, and any deviations from the approved plan.*

A track backhoe and low ground pressure dozer were used to process, mix, and build the Biopile. Manual labor was utilized when placing amendments and bulk agents to the soil. Thick layers of hay and straw were placed directly over the perforated pipes installed in the air circulation trenches to maintain good airflow. The air circulation lines at Biopile #2016 were designed to slope away from the blower in order to handle condensate generation. There were no problems encountered while operating the soil processing equipment at Biopile #2016. There were no deviations from the approved plan.

9(i) *A description of the source and tonnage of oil dry materials accepted for treatment and a description of the petroleum products which the oil dry materials were applied to.*

This condition not applicable because no oil dry material was accepted for treatment or included in Biopile #2016.

9(j) *A summary of any changes to the mechanical equipment, operating controls, or methods of operation due to operator experience and technical advances and any plan modifications necessary to incorporate long term or permanent changes to the plan of operation or approval conditions.*

No changes to the mechanical equipment, operating controls or methods of operation have been identified which will assist in the remediation process.

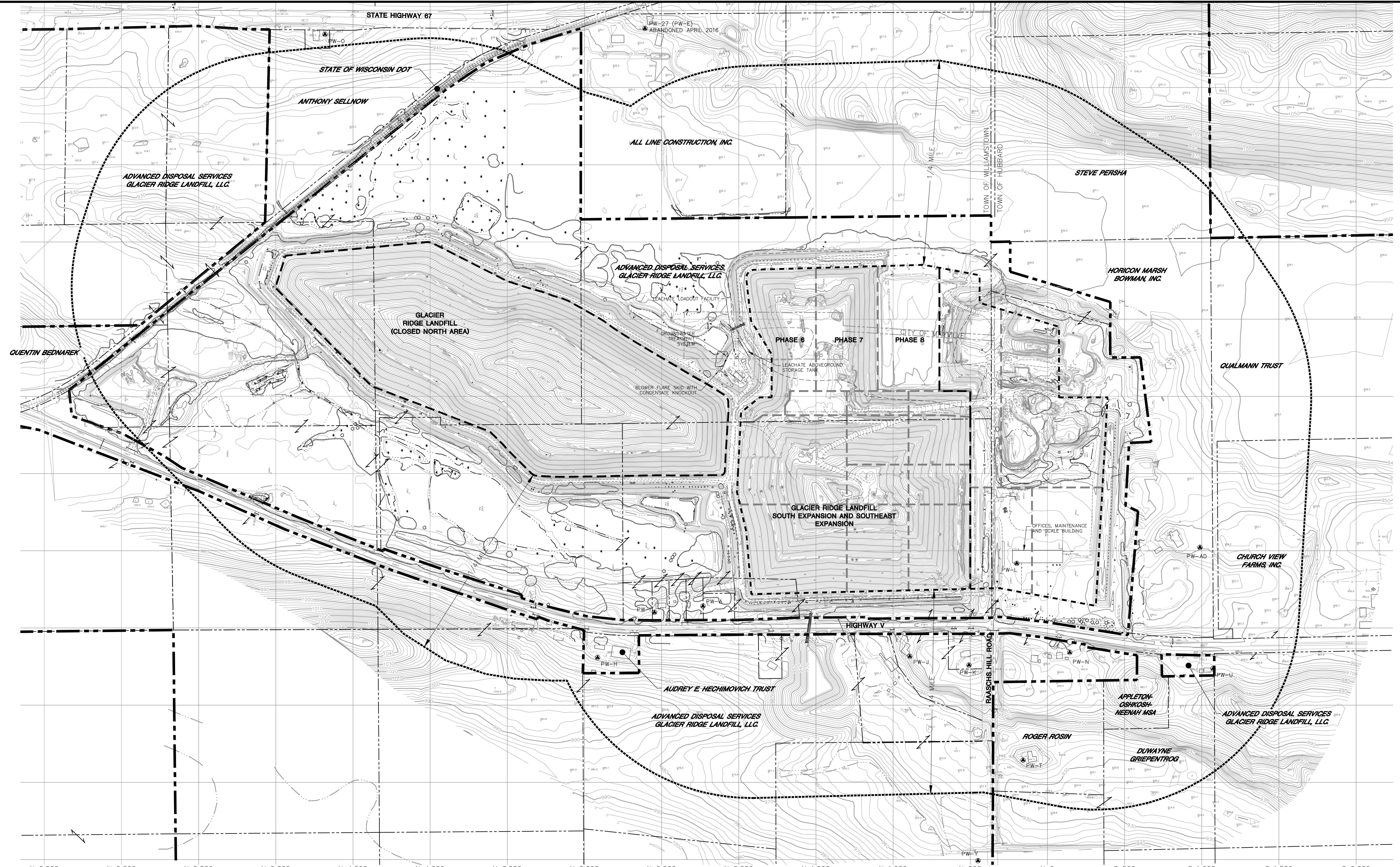
10 *Every fifth annual report shall assess the bioremediation process in comparison to recent technical literature on aerobic degradation of petroleum hydrocarbons, list the relevant technical references, summarize experience and data from operation of this facility, and propose any changes necessary to incorporate technical advances into the plan of operation.*

ADS-GRL has operated several bioremediation soil piles over the years and since the site has not experienced any difficulties operating the soil bioremediation piles, no changes of the plan of operations are recommended at this time.

A review of recent technical literature regarding aerobic degradation of petroleum hydrocarbons was conducted and compared to the operations at this facility, there were no new technologies or advancements that were feasible that could be incorporated into the plan of operation.

FIGURES

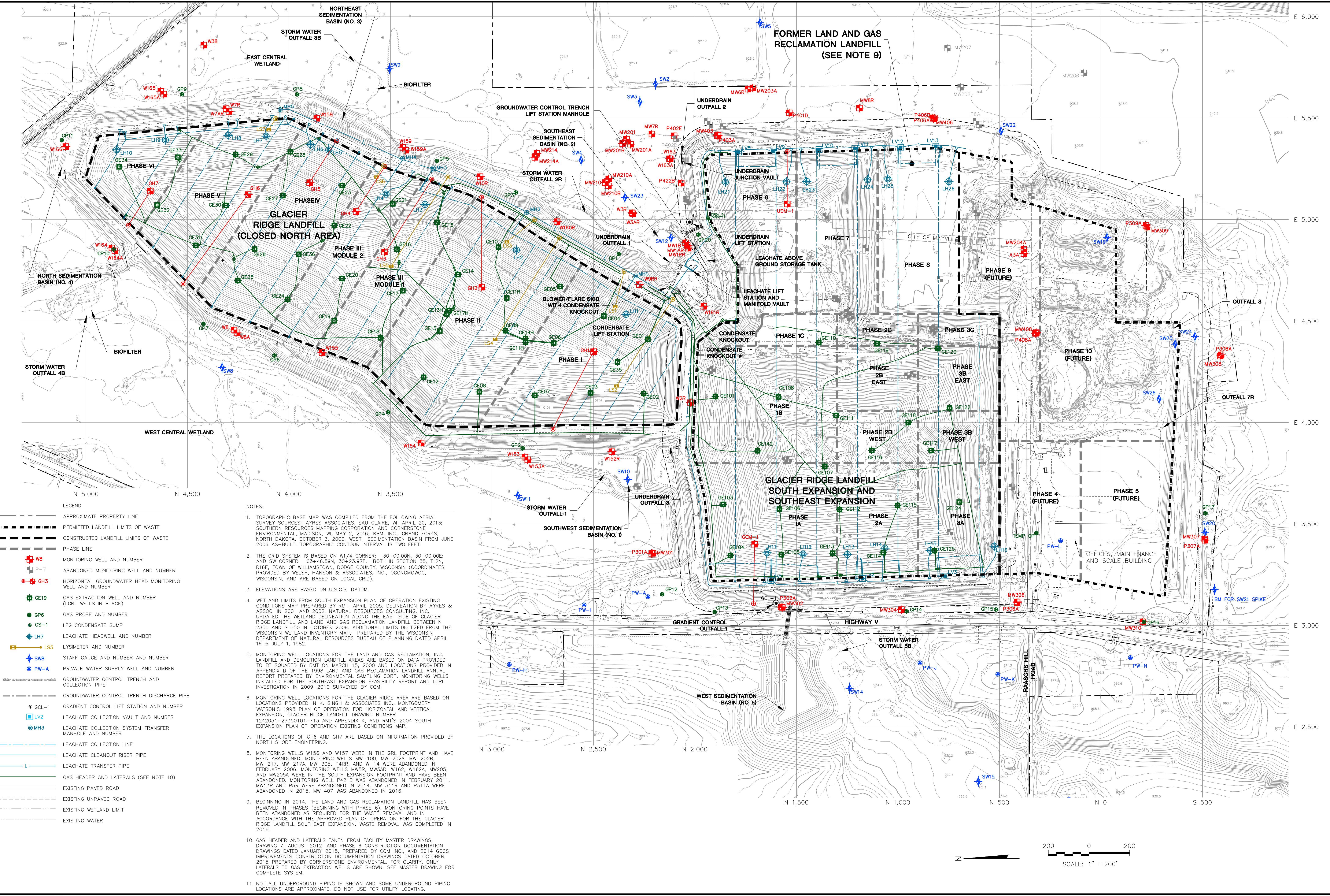
- Figure 1: Property Boundaries, Structures, and Private Wells
- Figure 2: Site Monitoring Plan
- Figure 3: Current Waste Filling and Cover System Development
- Figure 4: Final Cover Settlement Aerial Survey

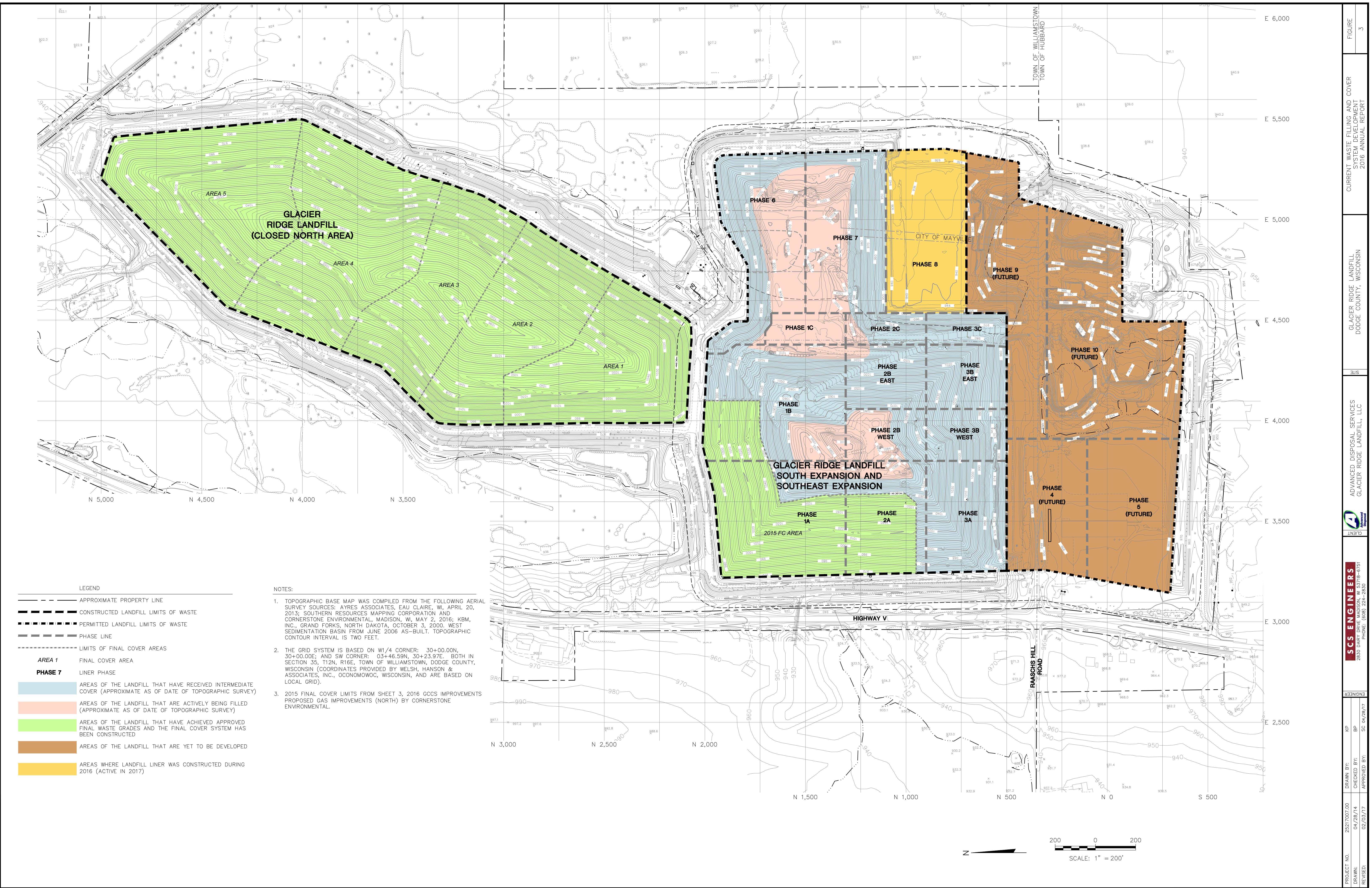


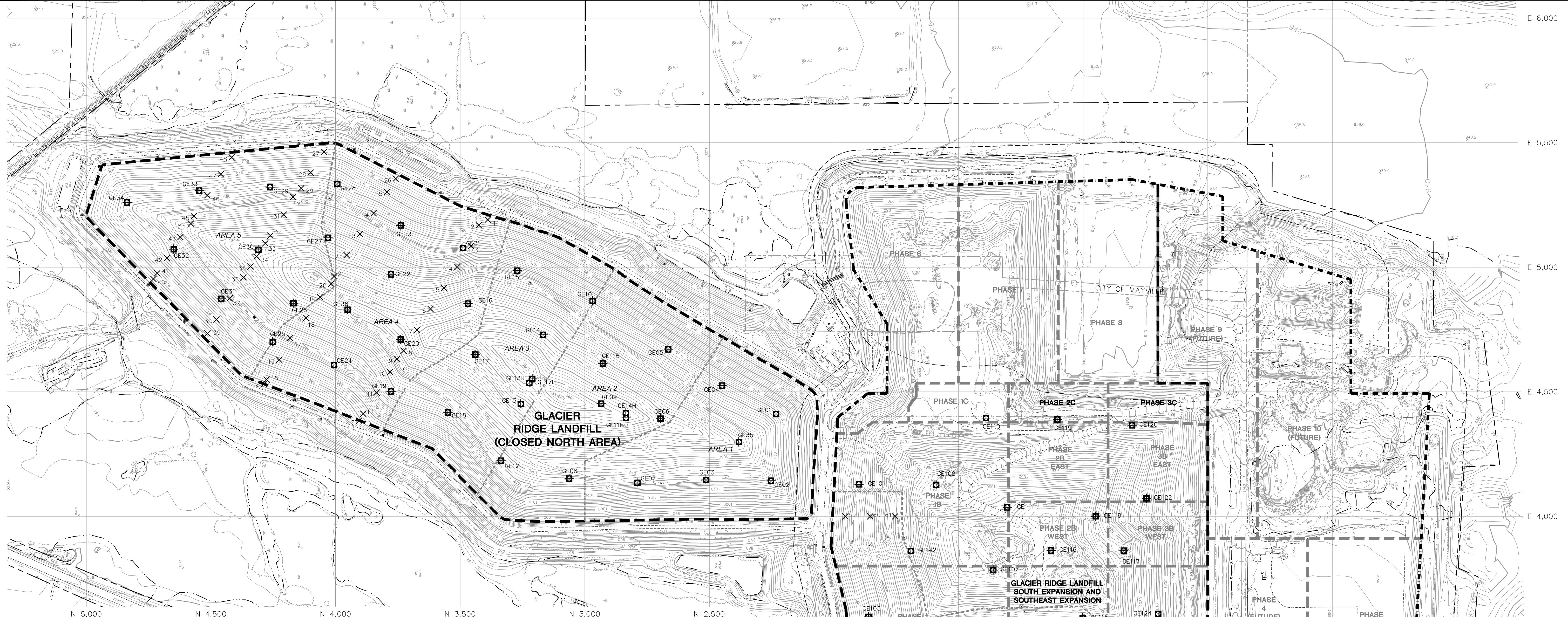
NOTES:

1. TOPOGRAPHIC BASE MAP WAS COMPILED FROM THE FOLLOWING AERIAL SURVEY SOURCES: ARIES ASSOCIATES, EAU CLAIRE, WI, APRIL 20, 2013; SOUTHERN RESOURCES MAPPING CORPORATION AND CORNERSTONE ENVIRONMENTAL, MADISON, WI, MAY 2, 2016; KBM, INC., GRANDE FORKS, NORTH DAKOTA, OCTOBER 3, 2000. WEST SEDIMENTATION BASIN FROM JUNE 2006 AS-BUILT. TOPOGRAPHIC CONTOUR INTERVAL IS TWO FEET.
2. THE GRID SYSTEM IS BASED ON W1/4 CORNER: 30+00.00N, 30+00.00E; AND SW CORNER: 03+46.59N, 30+23.97E. BOTH IN SECTION 35, T12N, R16E, TOWN OF WILLIAMSTOWN, DODGE COUNTY, WISCONSIN (COORDINATES PROVIDED BY WELSH, HANSON & ASSOCIATES, INC., OCONOMOWOC, WISCONSIN, AND ARE BASED ON LOCAL GRID).
3. PROPERTY BOUNDARIES ARE APPROXIMATE. PROPERTY INFORMATION OBTAINED FROM DODGE COUNTY LAND INFORMATION OFFICE ON JANUARY 12, 2017.

PROJECT NO.	28217007/00	DRAWN BY:	KP
DRAWN:	03/05/14	CHECKED BY:	BP
REVISED:	04/25/17	APPROVED BY:	SC 04/28/17/2830
FIGURE	1	STRUCTURES, PROPERTY BOUNDARIES, PRIVATE WELLS	GLACIER RIDGE LANDFILL, DODGE COUNTY, WISCONSIN






LEGEND

- APPROXIMATE PROPERTY LINE
- APPROXIMATE MUNICIPAL BOUNDARY
- EXISTING GROUND SURFACE (10' CONTOUR)
- EXISTING GROUND SURFACE (2' CONTOUR)
- CONSTRUCTED LANDFILL LIMITS OF WASTE
- PERMITTED LANDFILL LIMITS OF WASTE
- PHASE LINE
- LIMITS OF FINAL COVER AREAS
- AREA 1** FINAL COVER AREA
- PHASE 1** LINER PHASE
- GE32 GAS EXTRACTION WELL AND NUMBER
- X 5 SETTLEMENT MONITORING POINT AND NUMBER

NOTES:

- TOPOGRAPHIC BASE MAP WAS COMPILED FROM THE FOLLOWING AERIAL SURVEY SOURCES: ARIES ASSOCIATES, EAU CLAIRE, WI, APRIL 20, 2013; SOUTHERN RESOURCES MAPPING CORPORATION AND CORNERSTONE ENVIRONMENTAL, MADISON, WI, MAY 2, 2016; KBM, INC., GRAND FORKS, NORTH DAKOTA, OCTOBER 3, 2000. WEST SEDIMENTATION BASIN FROM JUNE 2006 AS-BUILT. TOPOGRAPHIC CONTOUR INTERVAL IS TWO FEET.
- THE GRID SYSTEM IS BASED ON W1/4 CORNER: 30+00.00N, 30+00.00E; AND SW CORNER: 03+46.59N, 30+23.97E. BOTH IN SECTION 35, T12N, R16E, TOWN OF WILLIAMSTOWN, DODGE COUNTY, WISCONSIN (COORDINATES PROVIDED BY WELSH, HANSON & ASSOCIATES, INC., OCONOMOWOC, WISCONSIN, AND ARE BASED ON LOCAL GRID).
- ELEVATIONS ARE BASED ON USGS DATUM.
- LIMITS OF THE MAY 2, 2016 AERIAL SURVEY INCLUDE ALL CONSTRUCTED LANDFILL AREAS.
- NORTH LANDFILL 2016 SETTLEMENT DATA BASED ON SURVEY PERFORMED BY CQM, INC. ON 10/14/2016. SOUTH EXPANSION 2016 SETTLEMENT DATA BASED ON 05/02/16 AERIAL SURVEY.

Point No.	Date Surveyed / Elevation										2015-2016 Annual Settlement (ft)	2007-2016 Total Settlement (ft)		
	North	East	9/20/07	5/20/08	8/15/08	6/29/09	6/23/10	6/29/11	6/26/12	6/17/13	7/19/14	6/30/15	10/14/16	
Area 4 Final Cover - Glacier Ridge Landfill (Closed North Landfill)														
1	3386.7	5191.0	975.31	975.4	974.8	974.7	974.6	974.7	974.7	974.7	974.7	974.7	0.0	0.6
2	3424.8	5168.4	978.9	978.4	-	978.1	977.7	977.7	977.3	977.6	977.5	977.5	0.1	1.4
3	3457.2	5085.0	1005.17	1004.5	-	1004.2	1003.6	1003.4	1003.1	1002.9	1002.9	1002.7	0.2	2.5
4	3511.1	5000.8	1027.02	1026.2	-	1025.5	1025.0	1024.6	1024.3	1024.1	1023.8	1023.8	0.1	3.3
5	3565.3	4916.8	1046.10	1045.0	-	1044.1	1043.6	1043.2	1042.8	1042.6	1042.3	1042.0	0.0	4.1
6	3619.0	4832.6	1064.13	1062.3	-	1060.8	1059.8	1058.9	1058.2	1057.8	1057.4	1057.1	0.2	7.2
7	3673.8	4748.1	1077.55	1075.5	-	1073.3	1071.9	1070.9	1070.1	1069.6	1069.2	1068.8	0.5	0.3
8	3727.2	4664.3	1058.81	1057.4	-	1056.2	1055.2	1054.8	1054.0	1053.7	1053.3	1053.1	0.3	6.0
9	3754.3	4630.8	1053.45	1051.6	-	1050.2	1049.4	1048.8	1048.3	1048.1	1047.6	1047.5	0.3	6.3
10	3781.3	4580.0	1037.34	1038.1	-	1035.0	1034.3	1033.8	1033.4	1033.2	1032.8	1032.6	0.2	4.7
11	3835.3	4456.2	1011.38	1010.9	-	1010.5	1010.1	1009.9	1009.8	1009.7	1009.4	1009.4	0.1	2.0
12	3889.2	4412.0	984.29	984.1	-	984.1	984.0	983.7	983.8	983.7	983.4	983.5	0.0	0.8
13	3905.7	4394.1	978.42	976.4	-	978.5	978.4	978.3	978.3	978.6	978.3	978.4	0.0	0.0
14	4286.0	4513.6	961.8	961.9	-	961.8	961.9	961.8	961.8	961.8	961.8	961.8	0.0	0.1
15	4275.9	4548.6	965.57	965.9	-	965.9	965.8	965.7	965.6	965.6	965.6	965.6	-0.1	0.3
16	4228.0	4528.3	989.37	989.1	-	988.8	988.3	988.0	987.9	988.0	987.6	987.6	0.0	1.8
17	4181.9	4715.9	1016.56	1015.5	-	1014.8	1014.2	1013.9	1013.8	1013.0	1013.0	1012.8	0.2	3.6
18	4116.8	4795.6	1036.84	1035.7	-	1034.6	1034.1	1033.6	1033.4	1033.2	1032.9	1032.6	0.2	4.2
19	4081.8	4879.5	1059.56	1057.3	-	1055.0	1053.9	1053.3	1052.7	1052.4	1052.0	1051.9	0.3	8.0
20	4017.7	4933.9	1072.71	1069.3	-	1066.6	1065.3	1064.3	1063.7	1062.9	1062.6	1062.4	0.2	10.3
21	4006.2	4962.8	1065.20	1062.1	-	1059.1	1057.9	1056.8	1056.4	1055.8	1055.4	1054.9	0.2	10.3
22	3855.8	5048.7	1041.93	1040.2	-	1038.7	1037.9	1037.3	1037.2	1036.7	1035.3	1035.1	0.1	5.9
23	3901.7	5133.1	1018.83	1017.7	-	1016.8	1016.2	1015.7	1015.4	1015.1	1014.9	1014.8	0.1	4.1
24	3847.5	5217.3	994.98	994.0	-	993.2	992.6	992.3	991.9	991.9	991.7	991.6	0.1	3.4
25	3793.6	5301.4	989.79	969.3	-	969.1	968.8	968.7	968.6	968.5	968.4	968.4	0.0	1.4
26	3758.3	5395.7	9541.7	9540.4	-	953.9	953.8	953.7	953.6	953.7	953.5	953.7	0.0	0.5

Point No.	Date Surveyed / Elevation										2015-2016 Annual Settlement (ft)	2015-2016 Total Settlement (ft)
	North	East	12/3/15	5/2/16	2015	2016	Settlement	2015	2016	Settlement		
2015 Final Cover Area - South Expansion												
49	1892.4	3500.0	989.3	989.3	0.0	0.0						
50	1792.4	3500.0	1014.2	1013.8	0.4	0.4						
51	1692.4	3500.0	1035.7	1033.9	1.8	1.8						
52	1592.4	3500.0	1032.7	1031.1	1.6	1.6						
53	1492.4	3500.0	1030.3	1028.5	1.8	1.8						
54	1392.4	3500.0	1028.9	1027.2	1.7	1.7						
55	1292.4	3500.0	1030.4	1028.7	1.7	1.7						
56	1192.4	3500.0	1031.7	1029.9	1.8	1.8						
57	1092.4	3500.0	1033.1	1031.1	2.0	2.0						
58	992.4	3500.0	1034.1	1031.9	2.2	2.2						
59	1954.6	4000.0	993.9	994.7	0.8	0.8						
60	1854.6	4000.0	1017.3	1017.1	0.2	0.2						
61	1754.6	4000.0	1041.6	1040.7	0.9	0.9						